

19, line 33. Support for new claim 86 can be found on page 6, line 28-page 7, line 10 as well as on page 11, lines 6-11. No new matter has been added.

Claims 57-67, 70-72, and 80-86 are pending.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned **"MARKED VERSION OF CHANGES TO THE CLAIMS."**

Summary of the Invention

The present invention relates to modified pigment products comprising a pigment having attached at least one aromatic or alkyl group X which is substituted with at least one group comprising the formula $-\text{[polymer]R}$. Ink compositions and, in particular, inkjet ink compositions comprising these modified pigment products are also disclosed.

Rejection of Claims Under 35 U.S.C. § 102

Claim 57-59, 65-67, and 69

The Examiner has rejected the above-identified claims under § 102(e) as being anticipated by Whitehouse et al. (U.S. Patent No. 6,337,358).

In paragraph 5 of the Office Action, the Examiner states that Whitehouse et al. disclose modified pigment having an attached group of the formula $A-R^1-C(R^2)(R^3)-X-SFR$, where A is an aromatic group, X is a polymer, and SFR is $O-Ar^2$ where Ar is an aromatic group and that it is further disclosed that the above group can be terminated with hydrogen instead of SFR. The Examiner also states that the polymer includes that obtained from monomers such as styrene and alkyl (meth)acrylate, i.e. polymer comprises presently claimed X' group of alkyl or aromatic group, as well as polyamide, polyvinyl alcohol, and polyester. The Examiner further states that there is also disclosed an ink jet ink which comprises a liquid vehicle and the above modified pigment. The Examiner concludes that, in light of this, Whitehouse et al. anticipates the present

claims. Applicant respectfully disagrees.

Claim 57, as herein amended, relates to a modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. "Polymer" represents a polycarbonate group, a polyelectrolyte group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof.

Regarding the cited reference, Applicant agrees that Whitehouse et al. relates to a modified pigment having attached group of the formula $A-R^1-C(R^2)(R^3)-X-SFR$ where A is an aromatic group and X is a polymer, and that it is further disclosed that the above group can be terminated with hydrogen instead of SFR. However, these are not the modified pigment products of the present invention. Specifically, the polymers disclosed in Whitehouse et al. are not the types of polymers disclosed in amended claim 57 of the present invention. Whitehouse et al. describes that polymers can be attached onto the disclosed SFR-containing attached groups by reacting the modified particles or aggregates with one or more polymerizable monomers, such as vinyl or diene containing monomers (see column 11, lines 21-25). A variety of examples of these monomers are shown in column 11, lines 25-41. One of ordinary skill in the art would recognize that these are all free-radical polymerizable monomers and would be the type that would react with a stable free radical (SFR) group, as taught by Whitehouse et al. In contrast, the polymeric groups represented by the group "polymer" of amended claim 57 are not the type formed from free-radical polymerizable monomers. Rather, these are either condensation-type polymers or are polymers formed by hydrolysis reactions of vinyl polymers. Furthermore, while some of these types of polymers are described by Whitehouse et al. at column 11, line 67-column 12, line 8, these are disclosed as being formed or located off of the main polymer chain (see column 11, lines 64-66).

Thus, Whitehouse et al. discloses a different class of attached polymers (namely, those formed from free radical-polymerizable monomers) and not those of amended claim 57. Claims 58-59 are dependent from claim 57 and are further distinguishable over the cited reference. Applicant therefore believes that Whitehouse et al. does not anticipate claims 57-59.

Claim 65, as herein amended, relates to an inkjet ink composition comprising at least one liquid vehicle and at least one modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. "Polymer" represents a polycarbonate group, a polyelectrolyte group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof. Applicant agrees that Whitehouse et al. discloses inkjet ink compositions comprising the above modified pigments. However, as discussed above, Whitehouse et al. does not disclose the modified pigment products of the present invention. Whitehouse discloses a different class of attached polymers (namely, those formed from free radical-polymerizable monomers) and not the polymeric groups represented by the group "polymer" of amended claim 65.

Thus, Whitehouse et al. does not disclose the inkjet ink composition of claim 65. Claims 66-67 are dependent from claim 65 and are further distinguishable over this cited reference. Applicant therefore believes that Whitehouse et al. does not anticipate claims 65-67.

Claim 69 has been cancelled without prejudice by this amendment, making the rejection of this claim moot.

Therefore, Applicant believes that remaining claims 57-59 and 65-67 are not anticipated by Whitehouse et al. and respectfully requests that this rejection be withdrawn.

Claims 57-59 and 65-67

The Examiner has rejected the above-identified claims under § 102(b) as being anticipated by Lin (U.S. Patent No. 5,281,261).

In paragraph 6 of the Office Action, the Examiner states that Lin discloses modified pigment wherein polymer is attached to pigment through aromatic group and that the polymer includes alkyl or aromatic group. The Examiner also states that there is disclosed an ink jet ink which comprises liquid vehicle and the above modified pigment. The Examiner concludes that, in light of this, Lin anticipates the present claims. Applicant respectfully disagrees.

Claim 57, as herein amended, relates to a modified pigment product comprising a

pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. "Polymer" represents a polycarbonate group, a polyelectrolyte group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof.

In contrast, Lin discloses pigment particles having attached polymerized vinyl aromatic salts (column 6, lines 1-4). Suitable vinyl aromatic salts are described in column 8, line 10-column 9, line 14, and methods to polymerize the vinyl aromatic salts are discussed in column 9, lines 30-61. As taught by Lin, the polymers attached to the pigment particles are polymers formed by free radical polymerization. These are not the polymeric groups of amended claim 57. One of ordinary skill in the art would recognize that the polymeric groups represented by the group "polymer" of amended claim 57 are not the type formed from free-radical polymerizable monomers but rather are either condensation-type polymers or are polymers formed by hydrolysis reactions of vinyl polymers.

Thus, Lin discloses a different class of attached polymers (namely, those formed from free radical-polymerizable monomers) and not those of amended claim 57. Claims 58-59 are dependent from claim 57 and are further distinguishable over the cited reference. Applicant therefore believes that Lin does not anticipate claims 57-59.

Claim 65, as herein amended, relates to an inkjet ink composition comprising at least one liquid vehicle and at least one modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. "Polymer" represents a polycarbonate group, a polyelectrolyte group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof. While Lin discloses inkjet ink compositions comprising modified pigments, as discussed above, these are not the modified pigments of the present invention. Lin discloses a different class of attached polymers (namely, those formed from free radical-polymerization of vinyl aromatic salts) and not the polymeric groups represented by the group "polymer" of amended claim 65.

Thus, Lin does not disclose the inkjet ink composition of claim 65. Claims 66-67 are

dependent from claim 65 and are further distinguishable over this cited reference. Applicant therefore believes that Lin does not anticipate claims 65-67.

Therefore, Applicant believes that claims 57-59 and 65-67 are not anticipated by Lin and respectfully requests that this rejection be withdrawn.

Claim 57

The Examiner has rejected the above-identified claim under § 102(b) as being anticipated by Hall et al. (U.S. Patent No. 5,552,458).

In paragraph 7 of the Office Action, the Examiner states that Hall et al. disclose modified pigment comprising pigment having attached group of the formula $R^2-Si(R^1)(R^3)-AX$ where R^2 is a C_1-C_{10} alkyl group and X is attached to polymeric backbone. The Examiner further states that the polymer includes polyacrylic, polyurethane, and polyester. The Examiner concludes that, in light of this, Hall et al. anticipates the present claim. Applicant respectfully disagrees.

Claim 57, as herein amended, relates to a modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-[polymer]R$. "Polymer" represents a polycarbonate group, a polyelectrolyte group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof.

In contrast, Hall et al. disclose optically variable pigments treated with a silane functional polymer having the formula $R^2-Si(R^1)(R^3)-AX$. These pigments are formed by the reaction of a silane containing compound which is then treated with a copolymer comprising a polymeric backbone substituted with a reactive functionality (see column 3, lines 43-46). Thus, the silane group reacts with the pigment, and the group X is selected to react with the reactive functionality on the polymeric backbone (see column 3, lines 47-48). These are not the modified pigment products of the present invention since the modified pigments of Hall et al. do not comprise a pigment having attached at least one aromatic or alkyl group X. Instead, the modified pigments of Hall et al. have an attached Si group. There is no disclosure in Hall et al. of an attached aromatic or alkyl group.

Therefore, Applicant believes that Hall et al. does not anticipate claim 57 and respectfully requests that this rejection be withdrawn.

Rejection of Claims Under 35 U.S.C. § 103(a)

Claims 60-61

The Examiner has rejected the above-identified claims as being unpatentable over Whitehouse et al. (U.S. Patent No. 6,337,358) or Lin (U.S. Patent No. 5,281,261) either of which in view of Belmont (U.S. Patent No. 5,571,311).

In paragraph 9 of the Office Action, the Examiner incorporates the statements concerning Whitehouse et al. and Lin from paragraphs 5 and 6 of the Office Action. The Examiner then states that Belmont et al. is drawn to modified pigment and discloses pigment having attached alkyl or aromatic group which is substituted with functional group such as carboxylic group or sulfonate group. The Examiner further states that the motivation for using such pigment is that it has increased water dispersability as compared to untreated pigment. The Examiner concludes that, in light of the motivation for substituting alkyl or aromatic group with functional group disclosed by Belmont et al., it therefore would have been obvious to one of ordinary skill in the art to use such functional group in the modified pigment of either Whitehouse et al. or Lin in order to produce a pigment with increased water dispersability, and thereby arrive at the claimed invention. Applicant respectfully disagrees.

Claims 60 depends from claim 57 and relates to a modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. "Polymer" represents a polycarbonate group, a polyelectrolyte group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof. X is further substituted with at least one functional group.

The modified pigment of present claim 60 is not the modified pigments disclosed in either Whitehouse et al. or in Lin. These references are discussed in more detail above. Thus,

Whitehouse et al. describes modified pigments having attached polymers prepared from free-radical polymerizable monomers of the type that would react with a stable free radical (SFR) group. Lin discloses modified pigments having attached polymers prepared from free-radical polymerization of vinyl aromatic salts. In contrast, the polymeric groups represented by the group "polymer" of present claim 60 are not the type formed from free-radical polymerizable monomers. Thus, neither Whitehouse et al. nor Lin discloses modified pigments of the present invention.

Belmont does not cure the deficiencies of either Whitehouse et al. or Lin. While Applicant agrees that Belmont discloses pigments having attached alkyl or aromatic groups which are substituted with functional groups such as carboxylic group or sulfonate group, there is no teaching or suggestion in Belmont of a modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. Thus, Belmont does not disclose the modified pigments of present claim 60.

Furthermore, neither Whitehouse et al. nor Lin, in combination with Belmont, teach or suggest the modified pigments of present claim 60. Instead, if one of ordinary skill in the art were to combine the teaching of Whitehouse et al. or Lin and Belmont, one would be lead to prepare a modified pigment having an attached aromatic group substituted with a functional group such as carboxylic or sulfonate groups and further comprising polymers prepared from free-radical polymerizable monomers. These are not the modified pigments of present claim 60.

Therefore, Applicant believes that claim 60, as well as claim 61 which depends from claim 60 and is further distinguishable over the cited references, are patentable over Whitehouse et al. or Lin, either in view of Belmont, and respectfully requests that this rejection be withdrawn.

Claims 62-64 and 70-72

The Examiner has rejected the above-identified claims as being unpatentable over Whitehouse et al. (U.S. Patent No. 6,337,358) or Lin (U.S. Patent No. 5,281,261) either of which in view of Johnson et al. (U.S. Patent No. 5,837,045).

In paragraph 10 of the Office Action, the Examiner incorporates the statements concerning Whitehouse et al. and Lin from paragraphs 5 and 6 of the Office Action. The Examiner then states that Johnson et al. is drawn to modified pigment and discloses pigment having attached chemical group such as carboxyphenyl or sulfophenyl in order to produce pigment that is more easily dispersible and has greater stability than untreated pigment. The Examiner concludes that, in light of this, it therefore would have been obvious to one of ordinary skill in the art to attach chemical group such as carboxyphenyl or sulfophenyl to modified pigment of either Whitehouse et al. or Lin in order to produce pigment with improved dispersability and stability, and thereby arrive at the claimed invention. Applicant respectfully disagrees.

Claims 62 depends from claim 57 and relates to a modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. "Polymer" represents a polycarbonate group, a polyelectrolyte group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof. The modified pigment product further comprises a second chemical group attached to the pigment.

The modified pigment of present claim 62 is not the modified pigments disclosed in Whitehouse et al. and in Lin. These references are discussed in more detail above. Thus, Whitehouse et al. describes modified pigments having attached polymers prepared from free-radical polymerizable monomers of the type that would react with a stable free radical (SFR) group. Lin discloses modified pigments having attached polymers prepared from free-radical polymerization of vinyl aromatic salts. In contrast, the polymeric groups represented by the group "polymer" of present claim 60 are not the type formed from free-radical polymerizable monomers. Thus, neither Whitehouse et al. nor Lin discloses modified pigments of the present invention.

Johnson et al. does not cure the deficiencies of either Whitehouse et al. or Lin. While Applicant agrees that Johnson et al. discloses a modified pigment having attached carboxyphenyl or sulfophenyl groups, there is no teaching or suggestion in Johnson et al. of a modified pigment

product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. Thus, Johnson et al. does not disclose the modified pigments of present claim 62.

Furthermore, neither Whitehouse et al. nor Lin, in combination with Johnson et al., teach or suggest the modified pigments of present claim 62. Instead, if one of ordinary skill in the art were to combine the teaching of Whitehouse et al. or Lin and Johnson et al., one would be lead to prepare a modified pigment having an attached aromatic group substituted with a functional group such as carboxyphenyl or sulfophenyl groups and further comprising polymers prepared from free-radical polymerizable monomers. These are not the modified pigments of present claim 62. Applicant therefore believes that claim 62, as well as claim 63-64 which depend from claim 62 and are further distinguishable over the cited references, are patentable over Whitehouse et al. or Lin, either in view of Johnson et al.

Claim 70 depends from claim 65 and relates to an inkjet ink composition comprising at least one liquid vehicle and at least one modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. "Polymer" represents a polycarbonate group, a polyelectrolyte group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof. The modified pigment product further comprises a second chemical group attached to the pigment.

The inkjet ink composition of present claim 70 is not the inkjet ink composition disclosed in either Whitehouse et al. or in Lin. These references are discussed in more detail above. Thus, neither Whitehouse et al. nor Lin discloses the modified pigment products of the present invention. Both disclose a different class of attached polymers and not the polymeric groups represented by the group "polymer" of present claim 70. Therefore, neither Whitehouse et al. nor Lin discloses the inkjet in composition of present claim 70.

As discussed in more detail above, Johnson et al. does not cure the deficiencies of either Whitehouse et al. or Lin. There is no teaching or suggestion in Johnson et al. of a modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X,

wherein X is substituted with at least one group comprising the formula: $-\text{[polymer]R}$. Furthermore, as discussed in more detail above, neither Whitehouse et al. nor Lin, in combination with Johnson et al., teach or suggest the modified pigments of the present invention. Applicant therefore believes that claim 70, as well as claim 71-72 which depend from claim 70 and are further distinguishable over the cited references, are patentable over Whitehouse et al. or Lin, either in view of Johnson et al.

Therefore, Applicant believes that claims 62-64 and 70-72 are patentable over Whitehouse et al. or Lin, either in view of Johnson et al., and respectfully requests that this rejection be withdrawn.

Conclusions

In view of the foregoing remarks, Applicant believes that this application is considered to be in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would further expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

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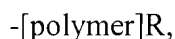
MARKED VERSION OF CHANGES TO THE CLAIMS

IN THE CLAIMS

Please cancel claim 69 without prejudice.

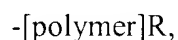
Please amend the claims as follows:

57.(Amended) A modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula:



wherein "polymer" represents a polycarbonate group, a polyelectrolyte group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof [repeating monomer groups or multiple monomer groups or both], optionally having at least one -X' group, wherein X' comprises at least one aromatic group or at least one alkyl group, and each X and X' can be the same or different, R represents hydrogen, a bond, a substituted or unsubstituted alkyl group, or a substituted or unsubstituted aromatic group, and the total amount of monomer groups of "polymer" is not greater than about 500 monomer repeating units, and when R represents a bond, R optionally bonds to said pigment.

65.(Amended) An ink composition comprising a) at least one liquid vehicle; and b) at least one modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula:

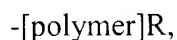


wherein "polymer" represents a polycarbonate group, a polyelectrolyte group, a polyether group, a polyimide group, a polyurethane group, a polyamide group, a polyester group, poly(vinyl

alcohol), or combinations thereof [repeating monomer groups or multiple monomer groups or both], optionally having at least one $-X'$ group, wherein X' comprises at least one aromatic group or at least one alkyl group, and each X and X' can be the same or different, R represents hydrogen, a bond, a substituted or unsubstituted alkyl group, or a substituted or unsubstituted aromatic group, and the total amount of monomer groups of "polymer" is not greater than about 500 monomer repeating units, and when R represents a bond, R optionally bonds to said pigment.

Please add the following new claims.

80. (New) An ink composition comprising a) at least one liquid vehicle; b) at least one modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X , wherein X is substituted with at least one group comprising the formula:



wherein "polymer" represents repeating monomer groups or multiple monomer groups or both, optionally having at least one $-X'$ group, wherein X' comprises at least one aromatic group or at least one alkyl group, and each X and X' can be the same or different, R represents hydrogen, a bond, a substituted or unsubstituted alkyl group, or a substituted or unsubstituted aromatic group, and the total amount of monomer groups of "polymer" is not greater than about 500 monomer repeating units, and when R represents a bond, R optionally bonds to said pigment., and c) at least one additional polymer.

81. (New) The ink composition of claim 80, wherein the additional polymer is a polymer selected from the group consisting of: a polyester, a polyester-melamine, a styrene-acrylic acid copolymer, a styrene-acrylic acid-alkyl acrylate copolymer, a styrene-maleic acid copolymer, a styrene-maleic acid-alkyl acrylate copolymer, a styrene-methacrylic acid copolymer, a styrene-methacrylic acid-alkyl acrylate copolymer, a styrene-maleic half ester copolymer, a vinyl naphthalene-acrylic acid copolymer, a vinyl naphthalene-maleic acid copolymer, and salts

thereof.

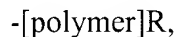
82. (New) The ink composition of claim 80, wherein the additional polymer is a styrenated acrylate.

83. (New) The ink composition of claim 80, wherein said "polymer" is a polyamide group, a polycarbonate group, a polyelectrolyte group, a polyether group, a polyimide group, a polyurethane group, a polystyrene group, a polyacrylate group, a polyamide group, a polyester group, poly(vinyl alcohol), or combinations thereof.

84. (New) The ink composition of claim 80, wherein the ink composition is an inkjet ink composition.

85. (New) The ink composition of claim 84, wherein the liquid vehicle is an aqueous vehicle.

86. (New) An ink composition comprising a) at least one liquid vehicle; and b) at least one modified pigment product comprising a pigment having attached at least one aromatic or alkyl group X, wherein X is substituted with at least one group comprising the formula:



wherein "polymer" represents repeating monomer groups or multiple monomer groups or both having at least one $-X'$ group, wherein each X and X' are the same and are attached to the pigment, R represents hydrogen, a bond, a substituted or unsubstituted alkyl group, or a substituted or unsubstituted aromatic group, and the total amount of monomer groups of "polymer" is not greater than about 500 monomer repeating units, and when R represents a bond, R optionally bonds to said pigment.